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HALL EFFECTS ON MHD SLIP FLOW PAST A POROUS VERTICAL PLATE WITH RADIATION AND SORET EFFECT IN A ROTATING SYSTEM

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ABSTRACT

In this Article, the unsteady free convective heat and mass transfer through a porous medium over infinite vertical porous plate in slip flow regime taking in to account with Hall Effect, soret effect in a rotating system is studied. The Plate is subjected to the suction velocity. The basic governing equations of the problem are transformed into a system of non dimensional differential equations, then it is solved analytically by using Perturbation techniques. The dimensionless Velocity, temperature and concentration profiles are displayed graphically showing the effects of fluid flow for the different values of the parameters like Magnetic M, Grashof Number Gr, chemical reaction parameter K_0***. It is observed that increase of Grashof Number Gr and Soret effects*** S_0 ***shows the increase effects of Primary and Secondary Velocity profile. But the reverse processes exists if the increase of magnetic effects. Temperature profile shows retardation while increase of Radiation parameter. The increase of chemical reaction parameter*** K_0 ***shows decrease effects of concentration.***

KEYWORDS: Hall Current, Soret Effect, Chemical Reaction, MHD, Porous Medium, Rotation, Heat Source

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Original Article

1. INTRODUCTION

Natural convection flow induced by buoyancy forces acting over bodies with different geometries in a fluid along a porous medium is prevalent in many natural phenomena and has varied and wide range of industrial applications. For example in atmospheric flows, the presence of pure air or water is not possible because of some foreign mass may be present naturally or artificially due to industrial emissions. Natural processes such as vaporization of mist and fog, photosynthesis are occur due to thermal and buoyancy forces developed as a result of difference in temperature or concentration or a combination of these two. Such configuration plays vital role in the industry based applications like heat exchange devices, cooling of molten metals, insulation systems, filtration, chemical catalytic reactors and processes. Considering these importance concepts of fluid flow we are able to construct so many problems by involving many parameters.

In many practical applications, the particle adjacent to a solid surface no longer takes the velocity of the surface. The particle at the surface has a finite tangential velocities, it is slips along the surface. The flow regime is called the slip-flow regime and this effect cannot be neglected.

Many studies have done to understand its characteristics in different systems such as reciprocating engines, pulse combustors and chemical reactors etc. MHD transient free convection with slip flows is associated with many applications in heat and mass transfer. The energy flux caused by a composition gradient is called the

Dufour or diffusion –thermo effect. Temperature gradients can also create mass fluxes, and this is the soret or thermal-diffusion effect. The Soret effect, for instance, has utilized for isotope separation, and in mixtures between gases with very light molecular weight..

Now a days radiation effects of fluid flow attracted so many researchers under the view, Ahmed N and Sarmah H.K [1] studied the Radiation effects on a transient MHD flow mass transfer past an impulsively fixed infinite vertical plate. Eckert E.R.G and Drake R.M [2] have analyzed that heat and mass transfer of fluid flow. Jain S.R. and Sharma P.K [3] investigated the effects of viscous heating on flow past a vertical plate in slip flow regime with periodic temperature variations. Investigation of hydromagnetic natural convection slip flow become so important because of its importance in various areas like geophysics, Earth magnetic field etc., Khaled A.R.A and Vafai K [4] have found the important results of heat and mass transfer of fluid flow with the effect of slip condition on stokes and coquette flows due to an oscillating wall.

In all these investigations, analytical or numerical solution is obtained assuming conditions for fluid velocity and temperature at the plate as continuous and well defined. Keeping in view this fact, several researchers investigated free convection flow from a vertical porous plate with variable suction like Kim Y.J [5] has investigated Unsteady MHD convective heat transfer past a semi –infinite vertical porous moving plate with variable suction. Kogan M.N [6] has investigated that the rarefied gas dynamics. Madhusudhana Rao B *et.al.,* [7] studied the MHD transient free convection and chemically reactive flow past a porous vertical plate with radiation and temperature gradient dependent heat source in slip flow regime. In similar way Mohamed et.al [8] have studied Radiation effects on unsteady MHD free convection with hall current near an infinite vertical porous plate. Muthucumaraswamy R and Kumar G.S [9] have developed the concepts of heat and mass transfer effects on moving vertical plate in the presence of thermal radiation. Pal D, Talukda B [10] have studied Perturbation analysis of unsteady magnetohydrodynamic convective heat and mass transfer in a boundary layer slip flow past a vertical permeable plate with thermal radiation and chemical reaction. Poonia H and Chaudhar R.C [11] have investigated The Influence of Radiative heat transfer on MHD oscillating flow in a planer channel with slip condition.

Due to importance of oscillation flow, Rabin N.Barik *et.al.,* [12] have studied the chemical reaction effect on mhd oscillatory flow through a porous medium bounded by two vertical porous plates with heat source and soret effect. Raptis A and Kafousias N [13] have investigated Magneto Hydrodynamics free convective flow and mass transfer through a porous medim bounded by a infinite vertical porous plate with constant heat flux. Moreover, several engineering processes occur at periodic temperature where the knowledge of periodic temperature of heat transfer becomes indispensible for the design of pertinent equipment, like Nuclear power plants, gas turbines and various propulsion devices for aircraft, missiles are examples of such area. Sharma P.K and Chaudhar R [14] investigated Effect of variable suction on transient free convection viscous incompressible flow past a vertical porous plate with periodic temperature variations in slip flow regime.

Extensions of these concepts, Srinivas S and Muthraj R [15] have investigated MHD flow with slip effects and temperature dependent heat source in a vertical wavy porous space. Sudhakar reddy T, Raju M.C [16] have investigated the effect of slip condition, Radiation and chemical reaction on Unsteady MHD periodic flow of a viscous fluid through satured porous medium in a planer channel. Sumathi K *et.al.,* [17] have investigated Heat and Mass Transfer in an Unsteady three dimensional mixed convection flow past an infinite vertical porous plate with consinusoidally fluctuating temperature. Watannebe K and Mizunuma Y.H [18] studied the Slip of Newtonian fluids at solid boundary. Yu S and Ahen T.A [19] have investigated the Slip flow heat transfer in rectangular micro channel.

The objective of this paper is to analysis the effect of Hall Current on MHD slip flow along an infinite vertical porous plate with soret effect and radiation in rotating system.The aim of the present study is extend the work of Madhusudhana Rao B. *et.al.*, by including the effects of hall current in rotation frame of reference.

2. FORMULATION OF PROBLEM

We consider the flow of an electrically conducting viscous incompressible fluid flow along a infinite vertical porous plate. The flow is oriented vertically upward along the x' - axis. Choose the origin at the plate lying in $x' - y'$ plane and y' axis normal to it. Hence, all the physical properties of the fluid are functions of y' and t'.

$$\frac{\partial v'}{\partial y'} = 0\,; \tag{1}$$

$$\frac{\partial u'}{\partial t'} + v'\frac{\partial u'}{\partial y'} + 2\Omega w' = \nu\frac{\partial^2 u'}{\partial y'^2} - \frac{\sigma B_0{}^2}{\rho(1+m^2)}(u' + mw') + g\beta(T' - T_\infty) + g\beta_c(C' - C_\infty) - \frac{\nu}{K_p'}u' \tag{2}$$

$$\frac{\partial w'}{\partial t'} + v'\frac{\partial w'}{\partial y'} - \mathbf{2}\Omega u' = \nu\frac{\partial^2 w'}{\partial y'^2} - \frac{\sigma B_0{}^2}{\rho(1+m^2)}(w' - mu') - \frac{\nu}{K_p'}w' \tag{3}$$

$$\frac{\partial T'}{\partial t'} + v'\frac{\partial T'}{\partial y'} = \frac{k}{\rho C_p}\frac{\partial^2 T'}{\partial y'^2} - \frac{1}{\rho C_p}\frac{\partial q_r}{\partial y'} \tag{4}$$

$$\frac{\partial C'}{\partial t'} + v'\frac{\partial C'}{\partial y'} = D\frac{\partial^2 C'}{\partial y'^2} + \frac{D_m K_T}{T_M}\frac{\partial^2 T'}{\partial y'^2} - K_0{}'(C' - C_\infty{}') \tag{5}$$

The boundary conditions relevant to the problem are;

$$u' = L_1\left(\frac{\partial u'}{\partial y'}\right), w' = L_1\left(\frac{\partial w'}{\partial y'}\right), T' = T'_w, C' = C'_w \; at \; y' = 0$$

$$u' \to 0, T' \to T_\infty{}', C' = C_\infty{}' \; at \; y' \to \infty \tag{6}$$

u', v' and w' are velocity components of velocity along x-axis, y axis and z axis directions respectively. t is the time, g is the acceleration due to gravity, β and β_c are the coefficients of volume expansion, ν is the kinematic viscosity, K'_0 is the chemical reaction of the fluid flow, ρ is the density of the fluid, σ is the electrical conductivity of the fluid, B_0 is the uniform magnetic field, T' is the temperature, C_p is the specific heat at constant pressure, q_r is the radioactive heat flux, $T_w{}'$ temperature of the wall as the temperature of the fluid at the plate, $T_\infty{}'$ is the temperature of the wall as well as temperature of the fluid away from the plate, $L = \left(\frac{2-m_1}{m_1}\right)$ being the mean free path where m_1 is the Maxwell reflection coefficient, C' is the concentration, D is the density, $C_w{}'$ is the concentration of the fluid at the wall as well as $C_\infty{}'$ is the concentration of the fluid away from the plate.

The equation of continuity (1) yields that v' is either a constant or some function of time, hence we assume that

$$v' = -v_0{}'(1 + \epsilon\, e^{-n't'}) \tag{7}$$

$v_0{}' > 0$, is the suction velocity at the plate and n' is the positive constant. The negative sign indicates that the suction velocity acts towards the plate. Consider the fluid, which is optically thin with a relatively low density and radioactive heat flux, is given by

$$\frac{\partial q_r}{\partial y'} = 4\,(T' - T_\infty{}')\,\mathrm{I} \tag{8}$$

Where I is the absorption coefficient at the plate.

On introducing the following dimensionless quantities

$$y = \frac{y' v_0'}{\nu}, t = \frac{v_0'^2 t'}{4\nu}, u = \frac{u'}{v_0'}, w = \frac{w'}{v_0}, n = \frac{4\nu n'}{v_0'^2}, M^2 = \frac{\sigma B_0^2 \nu}{v_0'^2} \; G_r = \frac{g\beta\nu(T_w' - T_\infty')}{v_0^3},$$

$$Gm = \frac{g\beta_C \nu(C_w' - C_\infty')}{v_0^3}, K_p = \frac{K_p' v_0'^2}{\nu^2}, T = \frac{T' - T_\infty'}{T_w' - T_\infty}, C = \frac{C' - C_\infty'}{C_w' - C_\infty}, Pr = \frac{\mu C_p}{k}, K^2 = \frac{\Omega \nu}{v_0'^2},$$

$$S_0 = \frac{D K_T (T_w' - T_\infty')}{\nu T_M (C_w' - C_\infty')}, K_0 = \frac{K_0' \nu}{v_0'^2}, M_1 = \frac{M^2}{1+m^2} \quad , R = \frac{4\nu I}{\rho C_p v_0'^2} \tag{9}$$

Substituting equation (9) in equations (2),(3), and (4),(5) we get

$$\frac{1}{4}\frac{\partial u}{\partial t} - (1 + \epsilon e^{-nt})\frac{\partial u}{\partial y} + 2K^2 w = \frac{\partial^2 u}{\partial y^2} - \frac{M}{1+m^2}(u + mw) + GrT + GmC - \frac{1}{Kp}u \tag{10}$$

$$\frac{1}{4}\frac{\partial w}{\partial t} - (1 + \epsilon e^{-nt})\frac{\partial w}{\partial y} - 2K^2 u = \frac{\partial^2 w}{\partial y^2} + \frac{M}{1+m^2}(mu - w) - \frac{1}{Kp}w \tag{11}$$

$$\frac{1}{4}\frac{\partial T}{\partial t} - (1 + \epsilon e^{-nt})\frac{\partial T}{\partial y} = \frac{1}{Pr}\frac{\partial^2 T}{\partial y^2} - RT \tag{12}$$

$$\frac{1}{4}\frac{\partial C}{\partial t} - (1 + \epsilon e^{-nt})\frac{\partial C}{\partial y} = \frac{1}{Sc}\frac{\partial^2 C}{\partial y^2} + Sr\frac{\partial^2 T}{\partial y^2} - K_0 T \tag{13}$$

With the following boundary conditions

$$u = h\left(\frac{\partial u}{\partial y}\right), w = h\left(\frac{\partial w}{\partial y}\right), T = 1, C = 1 \; at \; y = 0$$

$$u \to 0, T \to 0, C \to 0 \; at \; y \to \infty \tag{14}$$

Now Introducing the Complex Velocity $F = u + iw$, we express the Equation (10) and (11) can be combined into a single equation of the form

$$\frac{1}{4}\frac{\partial F}{\partial t} - (1 + \epsilon e^{-nt})\frac{\partial F}{\partial y} = \frac{\partial^2 F}{\partial y^2} - (M_1 + \frac{1}{Kp} - 2IK^2)F + GrT + GmC \tag{15}$$

Where $M_1 = \frac{M^2}{1+m^2}$, h$=\frac{L_1 v_0'^2}{\nu}$

With boundary condition,

$$F = h\left(\frac{\partial F}{\partial y}\right), y = 0 \tag{16}$$

$$F \to 0, y \to \infty$$

3. METHOD OF SOLUTION

To solve equations (12), (13) and (15), Assuming ε to be small so that one can express $F, T \; and \; C$ as a regular perturbation series interms ε as in the neighborhood of the plate as

$$\left.\begin{aligned} F(y,t) &= F_0(y) + \epsilon F_1(y)e^{-nt} \\ T(y,t) &= T_0(y) + \epsilon T_1(y)e^{-nt} \\ C(y,t) &= C_0(y) + \epsilon C_1(y)e^{-nt} \end{aligned}\right\} \tag{17}$$

Using the equation (17) in equations (12), (13) & (15) and equating the coefficient ϵ^2 of we get the set of ordinary differential equations

$$F_0''(y) + F_0'(y) - \left(M_1 + \frac{1}{Kp} - 2IK^2\right) F_0(y) = -GrT_0 - GmC_0 \tag{18}$$

$$F_1''(y) + F_1'(y) - \left(M_1 + \frac{1}{Kp} - 2IK^2 - \frac{n}{4}\right) F_1(y) = -F_0'(y) - GrT_1 - GmC_1 \tag{19}$$

$$T_0''(y) + PrT_0'(y) - R\,PrT_0(y) = 0 \tag{20}$$

$$T_1''(y) + PrT_1'(y) - \left(R - \frac{n}{4}\right) PrT_1(y) = -PrT_0'(y) \tag{21}$$

$$C_0''(y) + Sc\,C_0'(y) - Sc\,K_0C_0(y) = -ScSrT_0''(y) \tag{22}$$

$$C_1''(y) + Sc\,C_1'(y) - \left(K_0 - \frac{n}{4}\right) Sc\,C_1(y) = -ScC_0'(y) - ScSrT_1''(y) \tag{23}$$

Solving the equations (18) to (23)

$$T = e^{m_2 y} + \varepsilon(A_4 e^{m_4 y} + A_5 e^{m_2 y})e^{-nt} \tag{24}$$

$$C = A_7 e^{m_6 y} + A_8 e^{m_2 y} + \varepsilon(A_{17} e^{m_8 y} + A_{18} e^{m_6 y} + A_{19} e^{m_2 y} + A_{20} e^{m_4 y} + A_{21} e^{m_2 y})e^{-nt} \tag{25}$$

$$\begin{aligned} F = {} & \mathbf{A_{10} e^{m_{10} y} + A_{11} e^{m_2 y} + A_{12} e^{m_6 y} + A_{13} e^{m_2 y}} + \varepsilon(\mathbf{A_{23} e^{m_{12} y} + A_{24} e^{m_8 y} + A_{25} e^{m_2 y}} + \\ & \mathbf{A_{26} e^{m_6 y} \; A_{27} e^{m_2 y} + A_{28} e^{m_4 y} + A_{29} e^{m_2 y} + A_{30} e^{m_8 y} + A_{31} e^{m_6 y} + A_{32} e^{m_2 y} + A_{33} e^{m_4 y} + A_{34} e^{m_2 y}})\mathbf{e^{-nt}} \end{aligned} \tag{26}$$

3.1 Skin friction:

$$\begin{aligned} \tau_\omega = -\mu\left(\frac{\partial F}{\partial y}\right)_{y=0} = {} & (A_{10}\, m_{10} + A_{11} m_2 + A_{12} m_6 + A_{13} m_2 + \epsilon(A_{23}\, m_{12} + A_{24} m_8 + A_{25} m_2 + A_{26}\, m_6 + \\ & A_{27} m_2 + A_{28}\, m_4 + A_{29} m_2 + A_{30}\, m_8 + A_{31} m_6 + A_{32} m_2 + A_{33} m_4 + A_{34} m_2)e^{-nt} \end{aligned} \tag{27}$$

3.2 Heat Flux

$$\mathbf{Nu} = -\left(\frac{\partial \mathbf{T}}{\partial \mathbf{y}}\right)_{\mathbf{y=0}} = \mathbf{m_2} + \varepsilon \; (\mathbf{A_4 m_4} + \mathbf{A_5 m_2})\; \mathbf{e^{-nt}} \tag{28}$$

3.3 Mass Flux

$$\left(\frac{\partial C}{\partial y}\right)_{y=0} = (A_7 m_6 + A_8 m_2 + \epsilon(A_{17} m_8 + A_{18} m_6 + A_{19} m_2 + A_{20} m_4 + A_{21} m_2)e^{-nt} \tag{29}$$

4. RESULTS AND DISCUSSIONS

The effects of slip flow through a porous medium along infinite vertical porous plates in the presence of Hall Current and Soret Effect with homogeneous chemical reaction under the influence of magnetic field has been studied. The effects of parameters in the fluid flow are thoroughly analyzed and given in the form of graph to easily understand.

4.1 Velocity Field

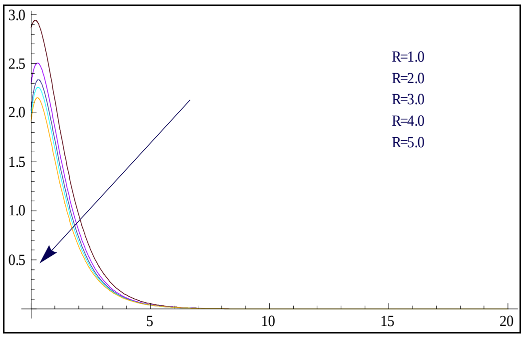
The increasing of Grashof number for heat transfer Gr, Soret effect S_r, magnetic number M, Rotation effect K^2retards the main and secondary velocity of the fluid flow, Hall Effects m accelerate the secondary velocity but retards the main velocity. In these sense, involving various parameters to analysis the fluid flow along infinite vertical porous plate. Skin friction shows increase effects while increase of Soret number.

4.2 Temperature Field

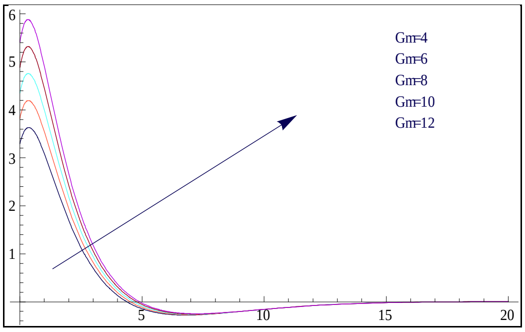
Temperature profiles of the flow field with the effected parameters like Prandtl number, Radiation effects, and Grashof number for heat transfer are graphically shown its effects on the flow field. Temperature profile goes on decrease while growing parameter Prandtl Number (Pr) and Radiation effects. Heat flux is decrease while increases of radiation parameter, other effect parameters are shown in graphically.

4.3 Concentration Field

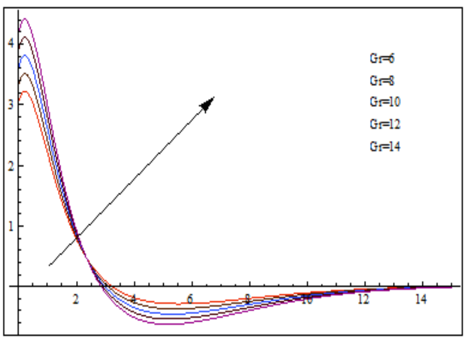
Schmidt Number and Chemical reaction parameter plays important role in the concentration fluid flow field. The effects of these parameters on the fluid flow field graphically shown. While growing Schmidt number (Sc) and chemical reaction parameter (Kr) decrease the concentration boundary layer thickness of the flow in similar way the effects of mass flux is increase while growing of soret parameter. All the parameters which are affect the heat and mass transfer are graphically shown.



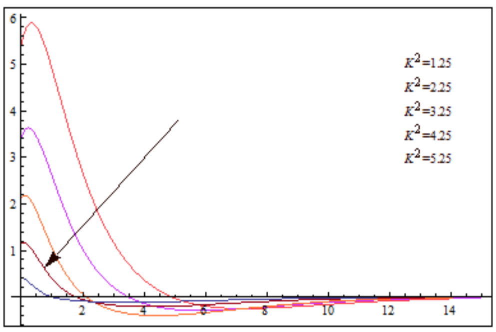
Primary Velocity for Various Value of R
Pr=0.71; R = 2; n=1.0; t=1.0; ε =0.01; Sc=0.25; K^2=1.0
K0=2.25;Sr=1.0;M=2.0;m=3.0;Kp=1;Gr=6;Gm=4;h=1.0
Figure 1



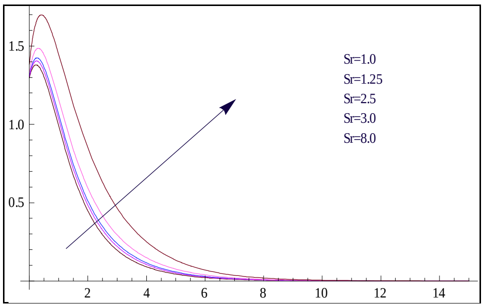
Primary Velocity for Various Value of Gm
Pr=0.71; R = 2; n=1.0; t=1.0; ε =0.01; Sc=0.25;
K0=2.25;Sr=1.0;M=2.0;m=3.0; K^2=1;Gr=6;h=1.0,Kp=1.0
Figure 2



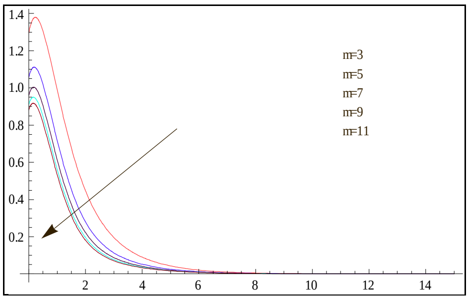
Primary Velocity for Various Value of Gr
Pr=0.71; R = 2; n=1.0; t=1.0; ε =0.01; Sc=0.25;
K0=2.25;Sr=1.0;M=2.0;m=3.0;Kp=1; $K^2 = 1.0$;Gm=4;h=1.0
Figure 3



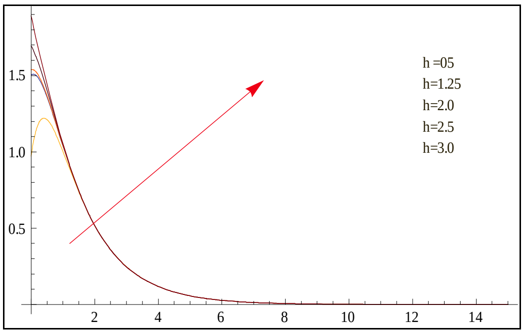
Primary Velocity for Various Values of K^2
Pr=0.71; R = 2; n=1.0; t=1.0; ε=0.01; Sc=0.25;
K0=2.25;Sr=1.0;M=2.0;m=3.0;Gr=6;Gm=4;h=1.0Kp=1.2;
Figure 4



Primary Velocity for Various Values of Sr
Pr=0.71; R = 2; n=1.0; t=1.0; ε =0.01; Sc=0.25;
K0=2.25; M=2.0;m=3.0;Kp=1;Gr=6;Gm=4;h=1.0; $K^2 = 1.0$;
Figure 5



Primary Velocity for Various Value of m
Pr=0.71; R = 2; n=1.0; t=1.0; ε□0.01; Sc=0.25;
K0=2.25;Sr=1.0;M=2.0;Kp=1;Gr=6;Gm=4;h=1.0; $K^2 = 1.0$
Figure 6

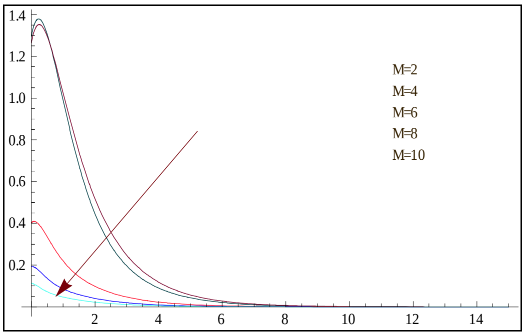


Primary Velocity for Various Value of h

Pr=0.71; R = 2; n=1.0; t=1.0; ε=0.01; Sc=0.25;

K0=2.25;Sr=1.0;M=2.0;m=3.0;Kp=1;Gr=6;Gm=4; K^2=1.0

Figure 7

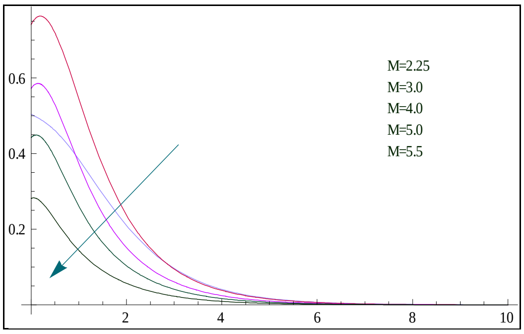


Cross section Velocity for Various Value of M

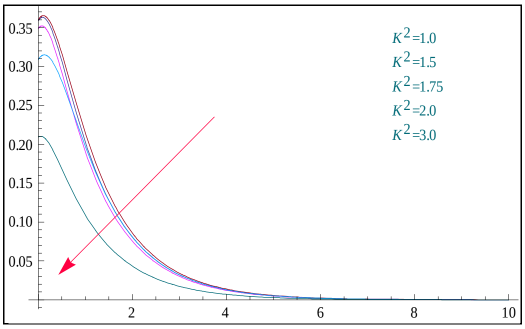
Pr=0.71; R = 2; n=1.0; t=1.0; ε=0.01; Sc=0.25;

K0=2.25;Sr=1.0; K^2=2.0;m=3.0;Kp=1;Gr=6;Gm=4;h=1.0

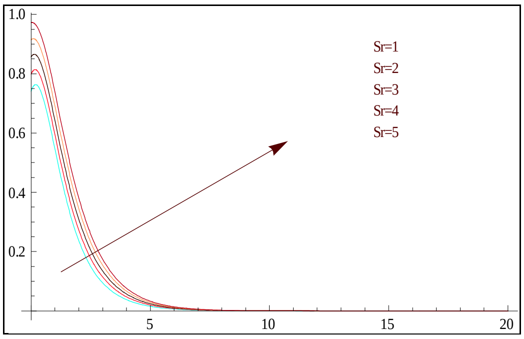
Figure 8



Cross Section Velocity for Various values of M
Pr=0.71; R = 2; n=1.0; t=1.0; ε=0.01; Sc=0.25;
K0=2.25;Sr=1.0; K^2=2.0;m=3.0;Kp=1;Gr=6;Gm=4;h=1.0
Figure 9



Cross Section Velocity for Various Value of K^2
Pr=0.71; R = 2; n=1.0; t=1.0; ε =0.01; Sc=0.25;
K0=2.25;Sr=1.0;M=2.0;m=3.0;Kp=1;Gr=6;Gm=4;h=1.0
Figure 10

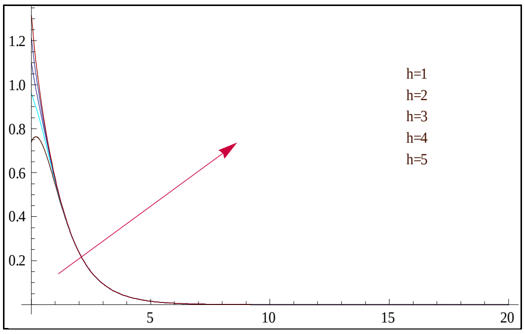


Cross section Velocity for Various Value of Sr

Pr=0.71; R = 2; n=1.0; t=1.0; ε=0.01; Sc=0.25;

K0=2.25; K^2=1.5; M=2.0;m=3.0;Kp=1;Gr=6;Gm=4;h=1.0

Figure 11

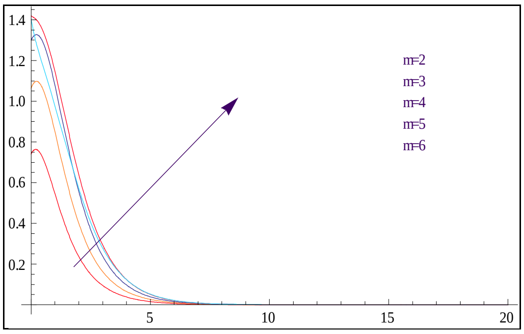


Cross Section Velocity for Various Value of H

Pr=0.71; R = 2; n=1.0; t=1.0; ε=0.01; Sc=0.25;

K0=2.25;Sr=1.0;M=2.0;m=3.0;Kp=1;Gr=6;Gm=4; $K^2 = 1.0$

Figure 12



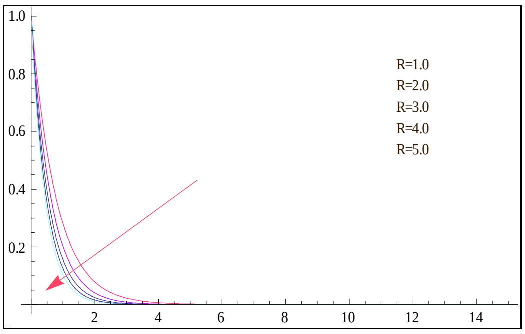
Cross Section Velocity for Various Value of m

Pr=0.71; R = 2; n=1.0; t=1.0; ε=0.01; Sc=0.25;

K0=2.25;Sr=1.0;M=2.0; Kp=1;Gr=6;

Gm=4;h=1.0; K^2=1.0

Figure 13



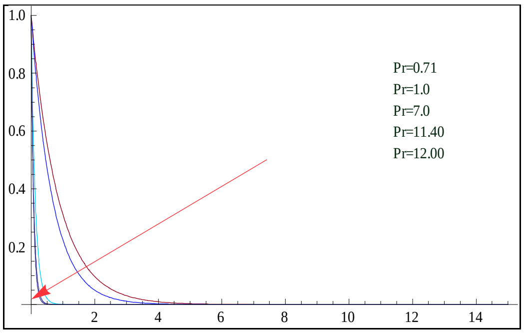
Temperature Profile for Various Value of R

Pr=0.71; n=1.0; t=1.0; ε=0.01;

K0=2.25;Sr=1.0;M=2.0;m=3.0;

Kp=1;Gr=6;Gm=4; $K^2 = 1.0$

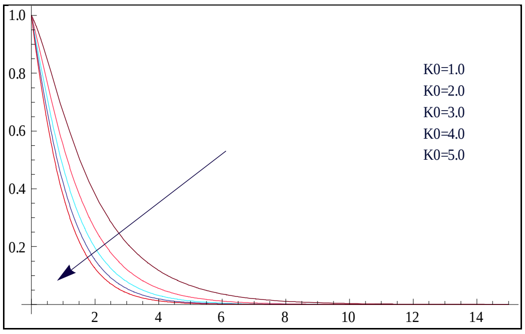
Figure 14



Temperature Profile for Various Values of Pr

R = 2; n=1.0; t=1.0; ε=0.01;

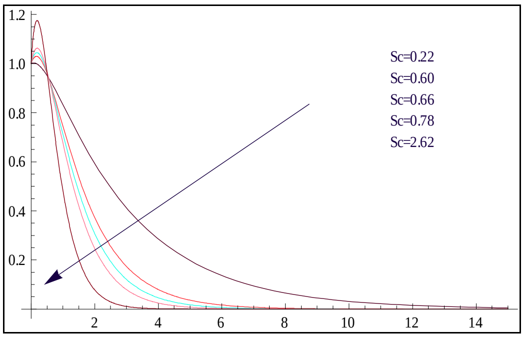
Figure 15



Concentration Profile for various Values K0

Pr=0.71; R = 2; n=1.0; t=1.0; ε=0.01; Sc=0.25;Sr=1.0;

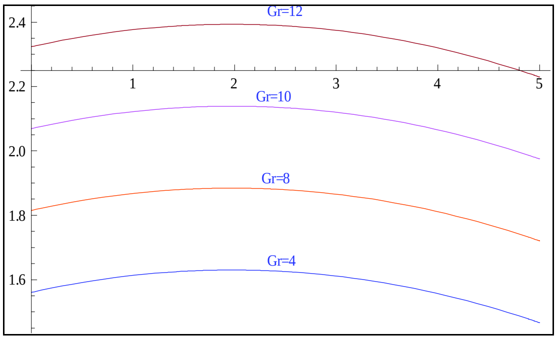
Figure 16



Concentration Profile for Various Values Sc

Pr=0.71; R = 2; n=1.0; t=1.0; ε=0.01; K0=2.25

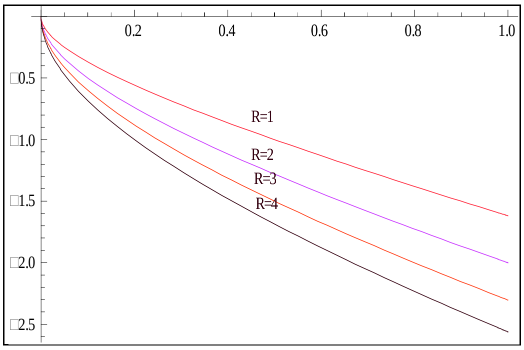
Figure 17



Skin friction for VARIOUS value of Gr

Pr=0.71; R = 2; n=1.0; t=1.0; ε=0.01; Sc=0.25;;Sr=1.0; K0=2.25;Sr=1.0;

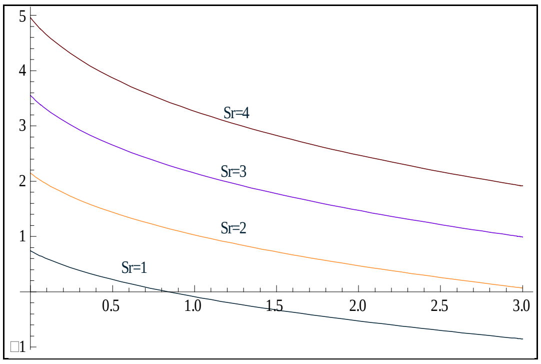
Figure 18



Heat Flux for Various Values of Radiation

Pr=0.71; R = 2; n=1.0; t=1.0; ε=0.01; Sc=0.25; K0=2.25;Sr=1.0;

Figure 19



Mass Flux for Various Values of Soret Number

Pr=0.71; R = 2; n=1.0; t=1.0; ε=0.01; Sc=0.25; K0=2.25;Sr=1.0;

Figure 20

CONCLUSIONS

In this paper clearly shows effects of the parameters in the flow fluid. The velocity, temperature and concentration profiles are shown graphically with various values of parameters.

- Increase of Soret (S_0) accelerates the main and secondary velocity of the fluid flow.
- Growing of Magnetic (M) retards the transient velocity of the fluid flow but Growing of Hall Parameter (m) retards the main velocity flow but the accelerates the secondary velocity of the fluid flow.
- Increasing of slip flow parameter enhances the primary and cross section velocity of the fluid flow.
- Increase of Rotation Parameter decreases the both primary and secondary velocity of the fluid flow.
- Prandtl numbers decrease the boundary layer of temperature profile of the fluid flow along a porous plat.
- The increase of chemical reaction parameter (K_0) and Schmidt Number (Sc) both retards the Concentration of mass.

- The variation of skin friction at the wall against the different values of Grashof Number shows the increase effect.
- The rate of heat transfer at the wall is decrease for the different values radiation.
- The rate of mass transfer at the wall is increase for the different values of Soret Number.

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